Abstract Submission

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Comparison Of A Benchtop And A Handheld Nir Spectrometer For Fish Authentication

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What is your preferred presentation method?: Oral presentation

Abstract Body: The high number of commercial frauds occurring in the fish sector is boosting the use of handheld NIR devices able to guarantee rapid and numerous analyses directly in different points along the food chain. Some works have already demonstrated the potential of NIR spectroscopy for fish authentication, but the suitability of portable spectrometers has been scarcely evaluated. The aim of this work was to compare the efficiency of a FT-NIR benchtop spectrometer (MPA, Bruker Optics) equipped with a fibre optic and a handheld NIR spectrometer (MicroNIR OnSite, Viavi Solutions) for the discrimination of fillets and patties of the valuable Atlantic cod (*Gadus morhua*) from those of the cheaper haddock (*Melanogrammus aeglefinus*). To the aim, 80 fresh fillets of Atlantic cod and 91 of haddock were kindly supplied by a dependable wholesale dealer. Each fillet was analysed in six different points and then minced to obtain two patties, each analysed in three different points with both the instruments. Spectra were acquired in diffuse reflectance, working within spectral ranges of 830-2200 nm and 950-1650 nm for benchtop and portable instrument, respectively. After averaging, spectral data were standardized by different pretreatments (smoothing, MSC, SNV, first and second derivatives), evaluated through PCA and then elaborated by means of two different classification techniques (LDA, SIMCA) after feature selection (algorithm SELECT). Classification models were validated using both a cross-validation procedure and three different external test sets. Data elaboration was performed with MatLab 2016a and V-PARVUS. LDA models calculated with FT-NIR spectra showed correct classification rates in prediction higher than 82 and 87% for fillets and patties, respectively. With MicroNIR spectra, slightly better results were obtained with a predictive ability higher than 89 and 92%. SIMCA models gave similar results for the two instruments, with good values of sensitivity in prediction (higher than 70% for all samples), but a limited specificity (44-77%). In summary, the use of a portable NIR device for fish authentication seems to be promising, thus paving the way to the on-site analysis of a high number of samples, in order to improve consumer protection against adulterations and fraudulent claims.

Keywords: Authenticity, Benchtop spectrometer, Fish, LDA, NIR spectroscopy, Portable device, SIMCA